Codes and Standards Enhancement Initiative
For PY2004: Title 20 Standards Development

Draft Analysis of Standards Options
For
Pre-Rinse Spray Valves

Prepared for:
Gary B. Fernstrom, PG&E

Prepared by:
Energy Solutions
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1 Introduction

The Pacific Gas and Electric Company (PG&E) Codes and Standards Enhancement (CASE) Initiative Project seeks to address energy efficiency opportunities through development of new and updated Title 20 standards. Individual reports document information and data helpful to the California Energy Commission (CEC) and other stakeholders in the development of these new and updated standards. The objective of this project is to develop CASE Reports that provide comprehensive technical, economic, market, and infrastructure information on each of the potential appliance standards. This CASE report covers standards and options for pre-rinse spray valves.

2 Product Description

Commercial dishwasher pre-rinse spray valves (pre-rinse valves) use hot water under pressure to clean food items off plates, flatware, and other kitchen items before they are placed into a commercial warewasher. Pre-rinse valves are handheld devices, consisting of a spray nozzle, a squeeze lever that controls the water flow, and a dish guard bumper. Often they include a spray handle clip, allowing the user to lock the lever in the full spray position for continual use. The pre-rinse valve is part of the pre-rinse unit assembly that typically includes an insulated handle, a spring supported metal hose, a wall bracket, and dual faucet valves. Pre-rinse valves are inexpensive and frequently interchangeable within different manufacturers' hose assemblies. They are usually placed at the entrance to a warewasher and can also be located over a sink, used in conjunction with a faucet fixture. Pre-rinse spray valves use approximately one to five gallons of water per minute (gpm) at 60 pounds per square inch (psi) (Food Service Technology Center, 2003).

3 Market Status

3.1 Market Penetration

There are three primary manufacturers of pre-rinse spray valves: Fisher Manufacturing (Fisher), Chicago Faucets (Chicago), and T&S Brass and Bronze Works, Inc (T&S). Fisher enjoys approximately 60 percent of the California market for pre-rinse spray valves[1].

Although there are an estimated 150,000 to 200,000 pre-rinse valves in service in California (California Urban Water Council, 2003), a substantial number of those are used for purposes other than rinsing dishes, such as filling sinks, hosing down equipment, etc. The Food Service Technology Center (FSTC) estimates there are 100,000 food establishments in California. While many of these establishments may have multiple pre-rinse spray valves, FSTC has noted that the vast majority has one valve dedicated to pre-rinse functions, and additional valves installed for other purposes (Bohlig, 2003). Therefore, we estimate there are 90,000 pre-rinse spray valves in use for pre-rinsing

[1] Fisher Manufacturing stated that in the Western United States, approximately 60% of food establishments are exclusively outfitted with Fisher products, including pre-rinse spray valves. Fisher states that this is probably a fair approximation of the market share for pre-rinse spray valves in California. Fisher also added that they hold approximately 90% of the market share for high efficiency pre-rinse spray valves.

wares in California. As usage data is only available for this subset of all spray valves in California, the savings calculations in this report conservatively limit the energy savings to these 90,000 units.

3.2 Sales Volume

Using the five-year design life of pre-rinse valves (see later section), annual sales volume is estimated at 18,000 units per year.

3.3 Market Penetration of High Efficiency Options

The FSTC provides third-party testing of pre-rinse spray valves for the California Urban Water Conservation Counsel (CUWCC) Rinse & Save incentive program. In order for a pre-rinse spray valve to qualify as a retrofit under Rinse and Save, it must have a flow rate equal to or less than 1.6 gpm, and rinse sixty plates (according to the CUWCC test procedure) within an average of 21 seconds or fewer per plate. As of September 2003, only Fisher appears to sell a product that meets the flow rate and efficacy requirements of the program.

Manufacturers claimed market penetration of efficient spay values is between 5 and 30 percent of total spray valve sales, though not all of these assertions were based on 1.6 gpm as the strict definition of high efficiency (T&S, 2003; Chicago, 2003). By weighting these responses by approximate manufacturer market share for all spray valves, the overall market penetration of high efficiency valves is estimated to be approximately 10 percent.

4 Savings Potential

4.1 Baseline Energy Use

The estimated installed baseline and associated energy use is shown in the table below. The baseline flow rate data was developed from flow rate measurement data collected by the FSTC in testing over 100 spray valves taken out of service in 2002 and 2003.

Table 1. Baseline Energy Consumption

Category	*Stock*	*UEC (therms/year)*	*AEC (Mtherm/year)*
Commercial Pre-Rinse Valve	90,000	1,566	141

Based on this research, baseline pre-rinse spray valves are assumed to use 3.15 gpm at 60 psi (FSTC, 2003). These spray valves are estimated to be in use for approximately four hours per day, 363 days per year (Sherer, 2003; Young, 2003). These estimates also assume a temperature rise of 52 degrees Fahrenheit, and a recharge or thermal efficiency of 76 percent.

4.2 Proposed Test Method

We propose the ASTM International (ASTM) Standard Test Method for Prerinse Spray Valves, ASTM designation F 2324-03. The test procedure includes methods for measuring water consumption and determining cleanability.

4.3 Efficiency Measures

Efficient pre-rinse spray valves save energy by providing a spray pattern with equivalent cleaning performance to baseline models, while using a lower flow rate. Thus, these models reduce heated water use and therefore water heating energy. Fisher has accomplished this by changing the shape of the water spray from a "shower spray" design in their baseline pre-rinse spray valve to a "fan shape" design in their efficient model.

4.4 Standards Options

This analysis assesses savings from pre-rinse spray valves that have a flow rate of less than 1.6 gpm, and that rinse sixty plates within an average of 21 seconds per plate or fewer. The threshold of 21 seconds per plate or fewer is based on the current requirement for qualifying pre-rinse spray valves under the CUWCC's Rinse & Save incentive program.

4.5 Energy Savings

Estimated energy savings are 820 therms per unit per year, with a potential statewide savings of 74,000,000 therms per year once all spray valves are changed out.[2] It should be noted that this statewide estimate is conservative because it includes only savings from 90,000 spray valves in use in conjunction with commercial dishwashers, whereas another 60,000 to 110,000 are used for a variety of applications with an undetermined proportion of hot water usage for an undetermined period of daily use. While the savings from such installations cannot be estimated with any degree of confidence, they are likely to be significant.

5 Economic Analysis

5.1 Incremental Cost

An incremental price of $5 was determined from actual prices offered in the market place. Although we gathered varying data on incremental price, $5 provides a conservative estimate given that economies of scale from full production of efficient models will drive prices downward.

Fisher's efficient pre-rinse spray valve retails for $5 more than their standard product. It was the opinion of the Fisher representative that this price difference represented the

[2] Assumes a savings of 1.65 gpm savings for 4 hours of use per day, 363 days per year, a temperature rise of 52 degrees Fahrenheit and combustion or burner efficiency of 76 percent. It should be noted that current high efficiency products have tested at flow rates closer to one gpm (Koeller, 2003). It was conservatively assumed that the average complying spray valve would have a flow rate of 1.5 gpm after the standard takes effect.

design difference between the two spray heads (Fisher Manufacturing, 2003). The standard valve uses a nozzle that produces a shower spray to clean, and the efficient valve uses a nozzle that produces a fan-shaped spray.

T&S has a an efficient spray valve that costs $25 more than their standard version of the same model; however, the T&S representative stated that this price difference was purely a function of volume and was not related to product design (T&S Brass and Bronze Works, 2003). At the other end of the spectrum, the CUWCC's Rinse & Save program assumes an incremental cost of $0 (Koeller, 2003).

5.2 Design Life

A typical pre-rinse spray valve is expected to last approximately five years, whether standard or high efficiency (Bohlig, 2003).

5.3 Life Cycle Cost

Total energy savings due to the proposed standard over the lifetime of an efficient pre-rinse spray valve are shown in Table 2 below

Table 2. Analysis of Customer Net Benefits

Proposed Standard	Design Life (years)	Annual Energy Savings (kWh)	Present Value of Energy Savings* ($)	Incremental Cost, Retail ($)	Net Customer Present Value** ($)
1.6 gpm or lower flow rate	5	820	$2,008	$5	$2,003

* Present value of energy savings calculated using a life cycle cost of $2.448/therm (CEC, 2001)
** Positive value indicates a reduced total cost of ownership over the life of the appliance.

6 Acceptance Issues

6.1 Infrastructure Issues

Although only one manufacturer offers a low flow pre-rinse valve that maintains efficacy as measured by the FSTC test method, that manufacturer appears to hold a majority of the market share. In addition, the base and incremental costs on this item are low. Therefore, we do not anticipate significant resistance to the proposed standard. Other manufacturers should be able to easily produce complying models in the time between the standards setting process and the effective date.

6.2 Existing Standards

There do not appear to be existing standards for pre-rinse valves.

7 Standard Recommendation

Given the large savings and minimal incremental cost issues, the Commission should establish standards for pre-rinse spray valves effective within one year of adoption. An appropriate test procedure exists and will be republished as an ASTM test method this fall. Pre-rinse spray valves must meet both maximum flow rate and minimum cleaning performance requirements. The standard language should read as follows:

The pre-rinse spray valve shall have a flow rate of less than 1.6 gpm when tested in accordance with ASTM's Standard Test Method for Pre-Rinse Spray Valves (F 2324-03). Additionally, the pre-rinse spray valve must pass the cleanability test in accordance with the ASTM's Standard Test Method for Spray Valves (F 2324-03).

8 References

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